

REMARKS

The above amendments and following remarks are responsive to all the points of rejections raised by the Examiner in the Office Action dated June 3, 2002. No new matters have been introduced by the Amendment. Entry and consideration of the Amendment is respectfully requested. The attached to this Amendment (entitled as Attachment I) shows the amendments made to the specification and claims 1, 9, 11, and 16 by bracketing the text that has been deleted and underlining the text that has been added.

STATUS OF APPLICATION

Upon entry of this Amendment, claims 1, 9, 11, and 16 will have been amended, claims 21-25 will have been added, and claims 1-25 will be all the claims pending in the application.

In the Office Action, the Examiner has objected to claims 3, 5-7, 9 and 16-17 as being dependent upon a rejected base claim, but indicated that claims 3, 5-7, 9 and 16-17 would be allowable if rewritten in independent form. Claim 11 is objected to because of minor informalities. Claims 11 and 16 are rejected under 35 U.S.C. § 112, first paragraph for possessing limitations not adequately described in the specification. Claims 1, 8, 11, 13-15 and 18-20 are rejected under 35 U.S.C. § 102(e) as being anticipated by Tochigi (U.S. Patent No. 6,118,593, hereafter Tochigi). Finally, claims 1-2, 4, 10-15 and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Mihara (U.S. Patent No. 2001/0013978A1, hereafter Mihara). Applicants respectfully traverse the objections and rejections for the following reasons.

RESPONSE TO OBJECTIONS TO THE CLAIMS

In the Office Action, claims 3, 5-7, 9 and 16-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicants chose not to rewrite claims 3, 5-7, and 16-17 because claim 1, as amended, is believed to be allowable. Therefore, claims 3, 5-7, and 16-17 are also believed in allowable condition based on their dependency from claim 1.

Claim 11 is objected to because the Examiner stated that "N_{3n}" "be a refractive index" does not specifically disclose for which lens element. Accordingly, Applicants have amended claim 11 to correctly specify a lens element.

Claim 9 has been rewritten into independent form including all of the limitations of the base claim and any intervening claims, as suggested by the Examiner, and is now believed to be allowable.

RESPONSE TO REJECTION UNDER 35 U.S.C. §112,

Claims 11 and 16 are rejected under 35 U.S.C. § 112, first paragraph for possessing limitations not adequately described in the specification. Specifically, the Examiner states that the claims recite a limitation of " $0.8 < F_{3n}/F_3 < 1.7$ " with F_{3n} being indicated as "a focal length of the negative lens element." Thus, the Examiner believes that F_{3n}/F_3 should be a negative value, but F_{3n}/F_3 is used for a positive lens unit. Applicants respectfully submit that claims 11 and 16 as well as the specification have been amended to recite the expression of "N_{3n} be a refractive index" as " $0.8 < |f_{3n}/f_3| < 1.7$."

RESPONSE TO REJECTION UNDER 35 U.S.C. §102

In the Office Action, claims 1, 8, 11, 13-15 and 18-20 are rejected under 35 U.S.C. § 102(e) as being anticipated by Tochigi (U.S. Patent No. 6,118,593, hereafter Tochigi). Claims 1-2, 4, 10-15 and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Mihara (U.S. Patent No. 2001/0013978A1, hereafter Mihara).

With regard to the §102 rejections to claims 1, 8, 11 and 18-20, the Examiner states that Tochigi discloses all of the features recited in claim 1. Specifically, the Examiner relies on col. 5, lines 59-60 of Tochigi for disclosing a zoom lens with the recited spacing between lens unit during movement from a wide-angle to a telephoto position. Accordingly, Applicants have amended claim 1 to distinguish the present invention over Tochigi.

The present invention as recited in claim 1, is directed to a zoom lens that comprises the first lens unit disposed at a position closest to an object side in the zoom lens, the second lens unit disposed at a position following the first lens unit in order from the object side, the third lens unit disposed at a position following the second lens unit in order from the object side. Thus, the optical power arrangement of the first, second and third lens units are designed to have negative, positive and positive powers, respectively, in the order from the object side. This is a feature not believed to be disclosed by Tochigi.

Tochigi teaches a zoom lens that the powers of the respective lens units are arranged to be positive, negative, positive and positive order. Thus, the claimed invention is different in power arrangement of the respective lens units from Tochigi.

Similarly, Mihara discloses a zoom lens in which the lens units are so arranged to have negative, positive, negative, positive and positive powers, and therefore the claimed invention

is different in power arrangement of the lens units from Mihara as well. For these reasons, claim 1 is believed to be distinguishable over Tochigi and Mihara.

Furthermore, Mihara cannot be used to support the §102 rejection because Mihara does not qualify as prior art. Specifically, the effective filing date of Mihara is December 21, 2000. However, the present invention claims priority from Japanese Application No. 2000-335379 which has a filing date of November 2, 2000. The priority documents filed on February 12, 2002, which has been received and acknowledged by the Examiner is believed to be sufficient to remove Mihara as prior art reference.

Therefore, Tochigi and Mihara cannot anticipate claims 1-2, 4, 8, 10-15, and 18-20, and all claims are believed to be in allowable condition.

Claims 21-25 are newly added to further define the subject matter of the present invention. Independent claims 21-22 included the specified arrangement of the lens units that are distinguishable over Tochigi and Mihara, and are believed to be allowable. Claims 23-25 are also believed to be allowable for their dependency from allowable independent claims 21 and 22.

CONCLUSION

In view of the above Amendment and arguments, Applicants respectfully submit that all of the pending claims are patentable over the prior art of record, and are now in condition for allowance.

Serial No. 10/016,156

Docket No. 1232-4783

AUTHORIZATION

Two checks each in the amount of 90.00 and \$110.00 to cover the fees for addition of five claims and a one-month extension of time respectively. The Commissioner is hereby authorized to charge any additional fees which may be required for this amendment, or credit any overpayment to Deposit Account 13-4503, Order No. 1232-4783.

Respectfully submitted,

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PATENT
Attorney's Docket No. 1232-4783

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : NANBA, et al. :
Serial No. : 10/016,156 : Group Art Unit: 2873
Filed : November 1, 2001 : Examiner: William C. CHOIC
For : ZOOM LENS AND IMAGE TAKING APPARATUS USING THE SAME

ATTACHMENT SHOWING MARKUP OF CHANGES

Commissioner For Patents
Washington, D.C. 20231

Sir:

Amendments made to the specification and claims herein are indicated in this attachment by bracketing the text that has been deleted and underlining the text that has been added.

IN THE SPECIFICATION

Please note the following amendments to the specification on page 16, lines 3-11, second paragraph:

(A-8) Letting f_{3n} be the focal length of the negative lens of the cemented lens of the third unit, f_3 be the focal length of the third unit, v_{3n} be the Abbe number of the material for the negative lens of the cemented lens of the third unit, and N_{3n} be the refractive index, it is preferable to satisfy

$$[0.8 < f_{3n}/f_3 < 1.7] \quad \underline{0.8 < |f_{3n}/f_3| < 1.7} \quad \dots(5)$$

$$v_{3n} < 40 \quad \dots(6)$$

$$1.7 < N_{3n} \quad \dots(7)--$$

Please note the following amendments to the specification from page 17, lines 6 to page 18, line 5, please replace the entire paragraph with the following:

--(A-13) The second unit preferably has a cemented lens formed by cementing a positive lens to a negative lens and a positive lens in a biconvex shape and satisfies

the following conditional expressions:

$$0.7 < R_b/R_a < 1.2 \quad \dots(2)$$

$$-0.6 < (R_d + R_c)/(R_d - R_c) < 0.6 \quad \dots(3)$$

$$0.3 < d/f_w < 0.5 \quad \dots(4)$$

$$[0.8 < f_{3n}/f_3 < 1.7] \quad \underline{0.8 < |f_{3n}/f_3| < 1.7} \quad \dots(5)$$

$$v_{3n} < 40 \quad \dots(6)$$

$$1.7 < N_{3n} \quad \dots(7)$$

where R_a is the radius of curvature of the lens surface of the cemented lens of the second unit which is nearest to the object side, R_b is the radius of curvature of the lens surface of the second unit which is nearest to the image side, R_c is the radius of curvature of the lens surface of the positive lens in the biconvex shape which is located on the object side, R_d is the radius of curvature of the lens surface of the positive lens which is located on the image side, d is the thickness of the cemented lens of the second unit, f_w is the focal length of the overall system at the wide angle end, f_{3n} is the focal length of the negative lens of the cemented lens of the third unit, f_3 is the focal length of the third unit, v_{3n} is the Abbe number of the material for the negative lens of the third unit, and N_{3n} is the refractive index.--.

IN THE CLAIMS:

Please note the following amendments to claims 1, 9, 11, and 16:

1. (Amended) A zoom lens comprising, in order from an object side to an image side:

a first lens unit of a negative optical power, said first lens unit being a lens unit disposed at a position closest to the object side in the zoom lens;

a second lens unit of a positive optical power, said second lens unit being a lens unit disposed at a position following the first lens unit in order from the object side; and

a third lens unit of a positive optical power, said third lens unit being a lens unit disposed at a position following the second lens unit in order from the object side, said third lens unit having a cemented lens formed by cementing a positive lens element to a negative lens element and moving along an optical axis for zooming,

wherein a space between said first and second lens units decreases, and a space between said second lens unit and said third lens unit increases in zooming from a wide angle end to a telephoto end, and

letting NL_i be the number of lens elements constituting an i th lens unit, a condition defined by

$$NL_3 < NL_2 \leq NL_1$$

is satisfied.

9. (Amended) A zoom lens [according to claim 1,] comprising, in order from an object side to an image side:

a first lens unit of a negative optical power;

a second lens unit of a positive optical power; and

a third lens unit of a positive optical power, said third lens unit having a cemented lens formed by cementing a positive lens element to a negative lens element and moving along an optical axis for zooming,

wherein a space between said first and second lens units decreases, and a space between said second lens unit and said third lens unit increases in zooming from a wide angle end to a telephoto end, and

letting NL_i be the number of lens elements constituting an i th lens unit, a condition defined by

$$NL3 < NL2 \leq NL1$$

is satisfied; and

wherein said third lens unit moves along a convex locus to the image side in zooming from the wide angle end to the telephoto end.

11. (Amended) A zoom lens according to claim 1, wherein letting f_{3n} be a focal length of the negative lens element of the cemented lens of said third lens unit, f_3 be a focal length of said third lens unit, v_{3n} be an Abbe number of the negative lens element of the cemented lens of said third lens unit, and N_{3n} be a refractive index of the negative lens element of the cemented lens of said third lens unit, conditional expressions,

$$[0.8 < f_{3n}/f_3 < 1.7] \quad 0.8 < |f_{3n}/f_3| < 1.7$$

$$v_{3n} < 40$$

$$1.7 < N_{3n}$$

are satisfied.

16. (Amended) A zoom according to claim 1, wherein

said second lens unit has, in order from the object side to the image side a cemented lens formed by cementing a positive lens element to a negative lens element and a positive lens element in a biconvex shape surfaces, and

letting R_a be a radius of curvature of a lens surface of the cemented lens of said second lens unit which is located nearest to the object side, R_b be a radius of curvature of a lens surface of the cemented lens of said second lens unit which is located nearest to an image side, R_c be a radius of curvature of a lens surface of said positive lens element in a biconvex shape which is located on the object side, R_d be a radius of curvature of a lens surface of said positive lens element in the biconvex shape which is located on the image side, d be a thickness of the cemented lens of said second lens unit on the optical axis, f_w be a focal length of an overall system at a wide angel end, f_{3n} be a focal length of the negative lens element of the cemented lens of said third lens unit, f_3 be a focal length of said third lens unit, v_{3n} be an Abbe number of the negative lens element of the cemented lens of said third lens unit, and N_{3n} be a refractive index, conditional expressions,

$$0.7 < R_b/R_a < 1.2$$

$$-0.6 < (R_d + R_c)/(R_d - R_c) < 0.6$$

Serial No. 10/016,156

Docket No. 1232-4783

$$0.3 < d/fw < 0.5$$

$$[0.8 < f_{3n}/f_3 < 1.7] \quad \underline{0.8 < |f_{3n}/f_3| < 1.7}$$

$$v_{3n} < 40$$

$$1.7 < N_{3n}$$

are satisfied.